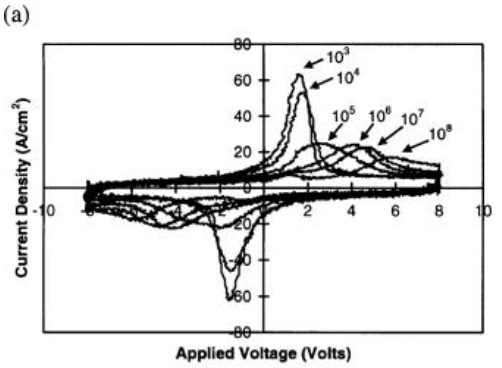
Reliability of Ferroelectric Thin Films: A Systematic Study of Point Defect Phenomena and Local Electronic Structure Effects ,

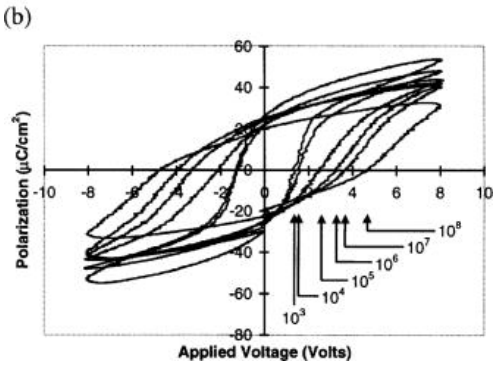
Paul C. McIntyre and Kyeongjae Cho, Stanford University,

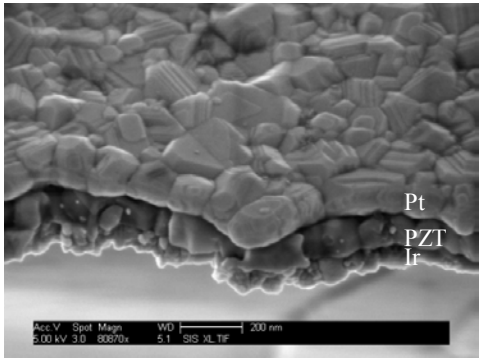
DMR0205949

Ferroelectric thin films (such as the poly-crystalline PZT film shown in a thin film Pt/PZT/Ir capacitor at bottom right) are being studied by many academic and industrial laboratories world-wide because of their promising applications in semiconductor memory devices.

Our research has shown that ferroelectric fatigue, the loss of switchable ferroelectric polarization after many voltage switching cycles, occurs by a cycle-dependent drift of the switching voltage of PZT (top and middle, right). These results offer important clues to the origins of ferroelectric fatigue, an important problem that may limit reliability of PZT-based semiconductor memories.







Reliability of Ferroelectric Thin Films: A Systematic Study of Point Defect Phenomena and Local Electronic Structure Effects ,

Paul C. McIntyre and Kyeongjae Cho, Stanford University,

DMR0205949

Education:

Three graduate students (Max Kelman, Jin-Young Hong, and Ruey-Ven Wang), one undergraduate (Sarah Rickman) and one postdoctoral research associate (Lawrence Schloss) contributed to this work. Undergraduate Rickman, a Chem. Eng. major at Lehigh University, was an NSF REU student at Stanford during the summer of 2003. She is now applying for admission in Sept. 2004 to Materials Science graduate programs for her doctoral studies. Kelman, a Hertz Foundation Fellow, completed his PhD in Materials Science at Stanford in July, 2003 and joined Intel's Component's Research group in Oregon. He was awarded to MRS Graduate Student Award (Silver) in December 2002.

Sarah Rickman (top) and Jin-Young Hong (bottom)